

Board Games and Entrepreneurial Skills Acquisition: A Mixed-Methods Study on the Efficacy of the EntreComp Framework in Higher Education

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Abstract: The landscape of higher education has witnessed a paradigmatic shift towards methodologies that are more interactive and engaging. The integration of gamification and board games as active learning methodologies in higher education, as well as the instruction in entrepreneurial competencies, has garnered significant interest for its potential to engage and motivate students, thereby enhancing learning outcomes. Gamification, characterized by the incorporation of game design elements into non-game contexts, offers a captivating and novel learning experience that fosters intrinsic motivation and active participation among students. One of the main ways of applying gamification is through board games, providing hands-on opportunities for students to apply theoretical knowledge in practical scenarios. A critical aspect of this educational innovation is its contribution to the instruction of entrepreneurial competencies, a domain gaining traction within higher educational settings. The European Entrepreneurship Competence Framework (EntreComp) stands at the forefront of this educational endeavor, offering a comprehensive blueprint for cultivating entrepreneurial skills and mindsets. This study is anchored in the context described above, with a focused aim to delineate which entrepreneurial competencies, as outlined by the EntreComp framework, are most effectively developed through these novel educational interventions. To facilitate this investigation, the "Game It Away!" project was initiated, encompassing three pilot studies. These pilots innovatively employed board games as the medium through which participants could acquire and hone their entrepreneurial skills. A key component of the learning process within these pilots was the maintenance of a learning journal by the students. This journal, filled with various reflective questions, provided a structured mechanism for participants to document and reflect upon their learning journey throughout the project. In this way, by using qualitative and quantitative methodologies, it is possible to verify the evolution of certain competences. The integration of gamification and board games within educational settings, particularly through the lens of the "Game It Away!" project, represents a pioneering approach to fostering entrepreneurial competencies among students. This study, leveraging both qualitative and quantitative methodologies, has illuminated the substantial potential of these innovative pedagogical strategies to revolutionize the teaching and acquisition of entrepreneurial skills as outlined by the EntreComp framework.

Keywords: Gamification; Board games; Entrepreneurship; EntreComp; Active Learning Methodologies

1. Introduction

In the evolving landscape of Higher Education, the shift towards more interactive and engaging teaching methodologies has become paramount in addressing the dynamic needs of contemporary students. This paper explores the integration of gamification and board games as transformative educational tools within the framework of the European Entrepreneurship Competence Framework (EntreComp), a leading strategy in cultivating entrepreneurial skills in higher education settings.

The increasing recognition of gamification, defined as the incorporation of game design elements into non-game contexts, presents a novel approach to education that stimulates student engagement and motivation. This methodology extends beyond traditional learning paradigms by harnessing the intrinsic motivation of students through competition, achievement, and rewards, thereby enhancing both cognitive and emotional engagement in learning processes.

In parallel to the rise of digital gamification, board games have emerged as potent educational tools. These games are not only pivotal in simulating real-world challenges that require strategic thinking and problem-solving, but also in promoting social interactions and teamwork among students. Such interactions are invaluable as they cultivate a suite of soft skills, including effective communication, negotiation, and collaboration, which are essential for both academic and professional success.

Central to this study is the EntreComp framework, which outlines a comprehensive array of competencies necessary for entrepreneurial success across three core areas: Ideas and Opportunities, Resources, and Into Action. Each of these pillars focuses on different aspects of entrepreneurship education, from the ability to identify opportunities to the practical application of ideas into tangible outcomes.

To empirically test the efficacy of integrating board games and the EntreComp framework, the "Game It Away!" project was initiated, involving a series of pilot studies at the University of Aveiro. These studies aimed to provide hands-on experiences where participants could develop entrepreneurial competencies through carefully designed board games. A significant aspect of the learning process in these pilots was the incorporation of learning journals, which allowed participants to reflect on and document their experiences and the competencies they developed throughout the intervention.

This innovative approach not only addresses the theoretical and practical components of entrepreneurial education but also offers a blueprint for future educational practices aimed at developing the necessary skills for today's global economy. By detailing the structure and outcomes of these pilot studies, this paper highlights the potential of gamification and board games to revolutionize the way entrepreneurial skills are taught and learned in higher education.

2. Literature Review

2.1 Gamification in Education

The rise of gamification in educational settings is not merely a trend, but a significant evolution in pedagogical strategies aimed at enhancing student engagement and improving learning outcomes. This methodology employs game design elements in environments traditionally empty of such characteristics to create a compelling learning experience. Gamification involves integrating game dynamics such as competition, achievement, and rewards into the educational process to foster a more engaging and motivating environment (Deterding et al., 2011).

The effectiveness of gamification has been substantiated through various studies. For example, a comprehensive review by Hamari et al. (2014) found consistent positive impacts of gamification on user engagement and motivation across different domains. This includes educational settings where traditional teaching methods might not sufficiently capture or sustain student interest.

Beyond just engagement, gamification can enhance retention and deepen the learning process. It does this by leveraging the natural human tendencies for competition and achievement—elements that are often strong motivational drivers. This is further supported by research from Sailer et al. (2017), who observed that gamification promotes not only cognitive engagement but also emotional and social engagement, thereby enriching the educational experience from multiple dimensions.

However, the application of gamification in education must be approached with nuance and precision. As cautioned by Whitton (2012), poorly implemented gamification can risk trivializing the content or overwhelming the educational goals with too much focus on the game aspects rather than learning outcomes. To this end, Caponetto et al. (2014) recommend that educators design gamified elements that are inherently linked to educational objectives, ensuring that these elements serve to reinforce the curriculum rather than distract from it.

2.2 The Importance of Boardgames as Learning Tools

When we talk about gamification nowadays, we often think about digital contexts. This tends to happen given the importance of digital games in the education of young people. However board games have also been recognized for their educational value.

According to Qian and Clark (2016), those games often simulate real-world challenges that require strategic thinking and tactical planning. This kind of gameplay encourages players to engage deeply with the content, applying theoretical knowledge in practical scenarios, which enhances their understanding and retention of information. The cognitive demands of these games can vary greatly, ranging from simple pattern recognition in younger children to sophisticated resource management and long-term planning in older students.

One of the most significant advantages of using board games in education is their ability to foster social interactions among students. According to Whitton (2012), board games naturally bring players together, creating opportunities for face-to-face interaction and teamwork. During these interactions, players learn to communicate effectively, negotiate with others, and work collaboratively to achieve common goals. These social skills are invaluable, as they translate directly to real-world abilities necessary for teamwork and cooperation in both academic and professional settings.

Research by Boyle et al. (2015) supports the notion that board games not only stimulate cognitive development but also encourage the growth of social competencies through collaborative and interactive gameplay. These games effectively simulate complex real-world challenges within a controlled setting, making them ideal for educational use.

Other impacts that need to be addressed is that traditional board games have also inspired digital adaptations, which combine the physical interaction of board games with the dynamic capabilities of digital technology. These hybrid forms of board games can include elements like apps or online platforms that augment gameplay with multimedia content, real-time data, and interactive features. This integration of technology enhances engagement and expands the educational possibilities of board games, making them more appealing and relevant to digital-native students.

2.3 The EntreComp Framework

The European Entrepreneurship Competence Framework, known as EntreComp (Bacigalupo et al., 2016), has established itself as a vital tool to guide the embedding of entrepreneurial skills within educational curricula. This framework outlines a comprehensive set of 15 competencies categorized under three pillars (figure 1): Ideas and Opportunities, Resources, and Into Action (Bacigalupo et al., 2016).

The pillar “Ideas and Opportunities” involves the ability to identify and seize opportunities for personal, professional, and societal benefits. This includes creative thinking, vision development, and ethical and sustainable thinking, which are essential for fostering an innovative mindset (Bacigalupo et al., 2016). As for the pillar of “Resources” incorporates both tangible and intangible elements, such as mobilizing and managing time, finances, materials, and human resources. This area emphasizes the importance of self-awareness and self-efficacy as foundational competencies for lifelong learning and adaptability. Lastly, the pillar of “Into Action” focuses on the ability to act upon opportunities, turning ideas into action. This includes planning and management, coping with uncertainty, ambiguity, and risk, as well as working with others to achieve common goals (Bacigalupo et al., 2016).



Figure 1: EntreComp Framework

These competencies are designed to be applied across a variety of educational and professional contexts, promoting a comprehensive approach to entrepreneurial education. The framework not only facilitates individual skill development but also supports the creation of a more entrepreneurial society.

Aligning gamification, board games, and the EntreComp framework in educational settings represents a transformative approach that aligns with contemporary educational needs. Gamification and board games enhance student engagement, motivation, and skill acquisition through interactive and enjoyable learning experiences. The EntreComp framework extends this impact by providing a structured approach to develop entrepreneurial competencies essential for the modern workforce.

Together, these elements create an innovative educational landscape where students not only acquire knowledge but also develop the critical, collaborative, and innovative skills needed in today's global economy. This holistic approach ensures that education is not only about information acquisition but about preparing learners to navigate and shape the future effectively.

3. Study Case

This article builds on the work developed under the scope of the project “Game It Away!”, which aims to develop and implement a new transdisciplinary and student-centred approach to teaching entrepreneurship, making it more effective in promoting an entrepreneurial mindset and skills and making entrepreneurship teaching more accessible to a wider and more diverse number of Higher Education students. That being said, the new approach is centered on learning entrepreneurship using gamification techniques, namely the creation of board games.

To put this new approach into practice, two pilot tests were carried out at the University of Aveiro in a makerspace under the SER+ project, a University of Aveiro project that allows students to get involved in teaching-related activities. In both pilots, a target of 25 participants was set, exclusively students from the University of Aveiro, and as a means of dissemination, publicity was carried out on social networks, by e-mail, posters were put up around campus and flyers were distributed.

3.1 First Pilot

In the initial pilot study, the participants comprised students from diverse academic levels: 61.5% were undergraduates, 23.5% were enrolled in master's programs, and 15.4% were doctoral candidates. Regarding nationality, the breakdown was as follows: 69.2% Portuguese, 15.4% Guinean, 7.7% Brazilian, and 7.7% Mozambican aged between 18 and 26. The pilot also highlighted a broad range of courses represented, including political science, psychology, public administration, tourism management and planning, economic and business sciences, engineering and industrial management, languages and business relations, physical engineering, and computer engineering.

3.2 Second Pilot

As for the second pilot, it followed the same pattern as the first pilot, i.e. a probabilistic sample, but only a total of 11 participants were obtained, all from degree courses and of Portuguese nationality, aged between 18 and 21. In terms of the courses they attend, the following were identified: quality management, electronic and computer engineering, quality management, marketing, and information technology.

3.3 Methodology

In the pursuit of this dynamic and innovative teaching methodology, it's important to highlight that the primary objective is to impart entrepreneurial skills to students using board games. This developed methodology combines theoretical learning with practical application, enabling students to engage deeply and reflect their understanding in a learning journal provided at the start of their participation. The methodology unfolds in five distinct phases: starting with an icebreaker, followed by a theoretical overview involving a presentation on EntreComp and game design, then progressing to the theme selection, prototype creation, and finally, the pitch presentation (figure 2).

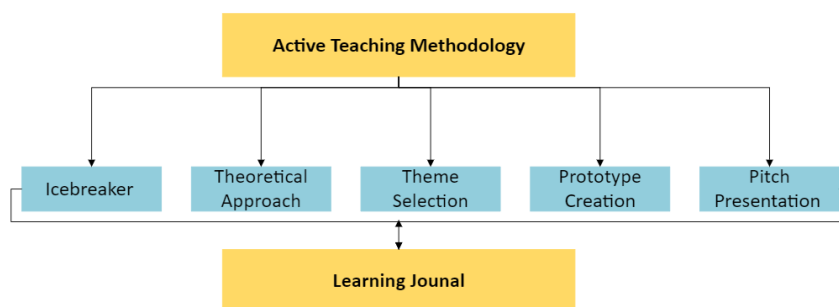


Figure 2: Active Teaching Methodology

Initially, considering that many students were unfamiliar with each other and recognizing that entrepreneurship thrives on network collaboration, an icebreaker was utilized. This was designed to focus on themes pertinent to the subsequent sessions, especially gamification. The activities might include simple games or mimics of popular games to facilitate easy understanding and prompt group formation, with groups capped at five participants.

Following the icebreaker, the session moves into a theoretical discussion that introduces various key concepts. This includes a literature review on EntreComp, which outlines essential competencies for entrepreneurial

success. Here, the facilitator uses captivating examples and encourages students to select, in groups, three competencies they wish to embody in their game design. Additionally, the segment on game design addresses the concept of game design itself, exploring different functions games can serve, common mechanics in board games, and practical examples, such as the mechanics used in Monopoly.

The subsequent phase involves choosing a theme for the game. This process includes guiding the students to consider factors such as target audience, cost implications, originality, the narrative of the game, and its cultural relevance. Creative themes are suggested to foster innovation.

Then, students move on to create a prototype, ideally in a makerspace equipped with all necessary materials. They are provided a worksheet to document important game aspects, including the game's name, theme, mechanics, rules, intended skills development, cost analysis for mass production, number of players, suitable age group, duration, resources needed, and the game's objectives.

The final phase entails a pitch where students present their game to other teams. This presentation strategically omits which skills the game aims to develop, challenging classmates to identify and justify these competencies. This ensures an evaluation of whether the game meets its intended educational objectives and skills development.

Throughout the process, students should be encouraged to reflect in their learning journal, which should then be handed in with an evaluation of the pilot.

4. Results

During the first pilot, students demonstrated a high level of satisfaction with the whole experience, averaging a score of 4.5 out of 5 on the Likert scale. They successfully identified desired themes and competencies to incorporate into their games, with nearly all games reflecting these competencies effectively. Additionally, students easily recognized the competencies in the games created by their peers. Notably, there was no repetition of themes, showcasing a broad range of creativity. However, reflections in the learning journal revealed that students desired more time for prototyping and less emphasis on theoretical content. Some also noted difficulties in reaching a consensus on the theme chosen by their group.

The second pilot maintained a high satisfaction level, with the same average score of 4.5 on the Likert scale. While the competencies chosen were clear in the games, students faced greater challenges than in the first pilot in selecting competencies and themes. The learning journals from the second pilot highlighted some frustrations, as several groups experienced significant discord regarding the choice of theme and competencies. Despite these challenges, students were proficient at identifying the intended competencies in the created games, and once again, there was no thematic repetition.

5. Discussion

The "Game It Away!" project was implemented through two pilot studies that utilized board games to instil and enhance entrepreneurial skills in students. Each pilot was designed to engage students from various academic programs and involved a multi-phased methodology that included an icebreaker, a theoretical overview, theme selection, prototype creation, and a pitch presentation. Feedback collected through learning journals indicated that while students enjoyed the interactive and practical aspects of the methodology, they expressed a desire for more time dedicated to the prototyping phase and less emphasis on theoretical content.

Across both pilots, students reported high satisfaction; however, they encountered challenges in theme and competency selection, with notable frustration and discord noted in the learning journals of the second pilot. These insights are crucial for refining the methodology, suggesting a need for improved guidance and support in the initial phases of the project.

Despite these challenges, the project successfully demonstrated that board games could be an effective tool for applying theoretical knowledge in practical scenarios, thereby enhancing the understanding and retention of entrepreneurial competencies. The absence of theme repetition and the ability of students to identify competencies in others' games underscore the creative engagement and depth of learning achieved.

6. Conclusion

The "Game It Away!" project has explored the integration of board games and the EntreComp framework in higher education to foster entrepreneurial skills, demonstrating a pioneering approach in pedagogical strategies. This study has highlighted the significant potential of gamification to revolutionize the way entrepreneurial competencies are taught and learned.

Through the deployment of two pilot studies, we have observed that board games not only make theoretical knowledge accessible but also engage students in a practical, hands-on manner that promotes deeper learning and retention of entrepreneurial skills. The learning journals served as a crucial tool in this process, allowing students to reflect on their learning experiences and providing valuable insights into the effectiveness of the methodology.

Students reported high levels of satisfaction across both pilots, underscoring the appeal of this interactive approach. However, challenges such as difficulties in theme and competency selection and the desire for more practical and less theoretical focus suggest areas for further refinement. The feedback from the learning journals particularly highlighted the need for better facilitation in the initial stages of theme and competency selection to reduce frustration and enhance the learning experience.

The absence of theme repetition and the successful identification of competencies by students in the games created by their peers demonstrate the project's ability to stimulate creativity and critical thinking. These outcomes affirm the value of board games as powerful educational tools that can effectively simulate real-world challenges and foster the essential skills required in today's entrepreneurial landscape.

Looking forward, we are planning to conduct a third pilot study. This next phase will incorporate the lessons learned from the previous pilots to further enhance our methodology. We aim to refine our approach to theme and competency selection and balance the theoretical and practical components more effectively.

Overall, the "Game It Away!" project contributes to the ongoing discourse on active learning methodologies by proving that well-designed gamification can significantly enhance student engagement and competency development. This initiative not only supports the acquisition of knowledge but also prepares students to navigate and shape their futures effectively, making it a valuable model for integrating entrepreneurial education into higher learning curricula. As we continue to refine and expand this methodology, it holds the promise of making entrepreneurial education more dynamic, accessible, and impactful for a broader and more diverse student population.

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